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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/508,914	09/22/2004	Avto Tavkhelidze	12079	8211

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Borealis Technical Limited  
23545 NW Skyline Boulevard  
North Plains, OR 97133-9204

EXAMINER

PERT, EVAN T

ART UNIT	PAPER NUMBER
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2826

DATE MAILED: 11/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/508,914

Applicant(s)

TAVKHELIDZE ET AL.

Examiner

Evan Pert

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 September 2004.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-53 is/are pending in the application.  
4a) Of the above claim(s) 27-53 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 17-26 is/are rejected.  
7) ☒ Claim(s) 1-16 is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 22 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 0904.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Claims 27-53 were designated as “withdrawn” in a preliminary amendment; accordingly, claims 27-53 were not examined. Claims 1-26 are pending; applicant’s remarks relating to “lack of unity” of invention are noted [in IFW, REM 9-22-04].

### ***Claim Objections***

2. Claims 1-16 are objected to under 37 CFR 1.75(c) as being in improper form since “claims 1 to 4” should read –any one of claims 1 to 4--. See MPEP § 608.01(n). For purposes of examination, claims 1-16 are considered to include “any one of” to properly be in the alternative form only in accordance with MPEP 608.01(n)(I)(B).

3. Claim 11 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim since independent claim 1 requires “depth” to be “5 to 20 times a roughness” while dependent claim 11 does not further limit claim 1 since it merely adds that “depth” is “*greater* than a roughness”.

4. Claims 19 and 20 are objected to since “electromagnetic radiation” is not the kind of “radiation” from an “ion beam” or “e-beam.” For example, US 2005/0243298A1 at [0049] distinguishes between “electromagnetic radiation” (i.e. photons) and “ion beams” or “electron beams” (i.e. beams of particles).

5. Claims 1-16 are objected to because “material” is used to mean –structure--.

While applicant may flexibly adopt terminology when drafting a patent application, the use of “material” in the preamble of claims 1-16 is unnecessarily unclear. The thing being claimed that “comprises a substantially plane slab of metal” is properly called a “structure” of “materials” rather than “a material” comprising structural features.

Applicant should change “material” in claims 1-16 to –structure--, for better compliance with 37 CFR 1.71.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 17-18 and 21-24 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Hunter, Jr. et al. (US 5,660,738) such as in the upper block of Fig. 3 per col. 5, wherein the preambles of pending claims 17-26 are not given significant patentable weight in accordance with MPEP 2111.02, and only steps (a) to (d) are treated as having significant patentable weight.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 19-20 and 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hunter Jr. et al. (US 5,660,738).

Regarding claims 19-20, the '738 reference is silent about ablating with an "e-beam" or "ion-beam" since the reference teaches using a "laser" for ablation. Yet, it was well known before the '738 reference that an e-beam and ion-beam are useful radiation sources for ablation of portions of a layer in patterning the layer as a mask. It would have been obvious to one of ordinary skill in the art at the time of the claimed invention to use an e-beam or ion beam for ablating in lieu of the laser, since both the ion beam and e-beam offer advantages of controlled focusing and patterning of a layer to be used in a mask as in the '738 patent [see MPEP 2144].

Regarding claims 25-26, it was well known before the '738 patent that metal granularity affects electrical properties, with monocrystalline having the least resistivity. It would have been obvious to one of ordinary skill in the art at the time of the claimed invention to adopt monocrystalline metal for interconnects being patterned in the '738 patent, motivated to affect electrical conductivity of the interconnects [see MPEP 2144].

***Allowable Subject Matter***

9. Claims 1-16 are objected to for informalities noted in this communication, yet are otherwise allowable.

10. The following is a statement of reasons for the indication of allowable subject matter:

The prior art does not explicitly disclose a structure including “a plane slab of a metal” having on a surface “one or more indents” of a “depth 5 to 20 times the surface’s roughness” and a “width approximately 5 to 15 times the depth” (e.g. a surface of a metal electrode patterned with indents that increase the Fermi energy level of electrons for increased electron emission as compared to not having the indents).

The International Search Report (PCT/US03/08907) indicates that US 6,117,344 is evidence of a “lack of inventive step” concerning the structure claimed in claims 1-16. However, in accordance with 35 USC 102/103, the claim element of “surface roughness” must be discussed or inherently present; yet the ‘344 patent does not include “roughness,” and motivation to select the particularly claimed relationships between “depth,” “width,” and “roughness” is missing; evidence of record indicates that metal can have a highly variable surface roughness, while applicant claims a certain relationship between geometry of the indents in the metal and the surface roughness of the metal, for increased Fermi energy of electrons to be ejected from the metal surface.

The examiner hypothesizes that a metal surface somewhere may have “at least one indent” that has a “depth” and a “width” that falls within the claimed ranges relative to “roughness,” yet the examiner cannot find any evidence of such existence.

Notably, adherence to the requirements of written description under 35 USC 112, 1<sup>st</sup> paragraph must be followed strictly for proper claim interpretation when contemplating enforceability in a case of accused infringement.

***Conclusion***

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Evan Pert whose telephone number is 571-272-1969. The examiner can normally be reached on M-F (7:30AM-3:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ETP  
November 9, 2005

  
**EVAN PERT**  
**PRIMARY EXAMINER**